the principal to draw up a scheme for the better instruction of engineering students. This he did, and the scheme provided for the establishment of a separate faculty of applied science, with its own chair of mathematics. The principal then said that if Dr. Bovey would remain his scheme would be carried into effect as soon as funds permitted. Dr. Bovey agreed to remain, and by constant and heroic struggles during the next twenty-five years, he gradually built up one of the finest engineering schools in the world.

Money came in at first very slowly, and only Dr. Bovey's marvellous tact and the respect and affection which he everywhere inspired enabled him to make any headway with his scheme. At last he succeeded in interesting Mr. (now Sir William) Macdonald, a rich and respected Montreal merchant, in his plans. This gentleman travelled with Dr. Bovey over the United States in order to inspect the fine engineering schools of that country. Dr. Bovey stimulated his friend's Canadian patriotism by pointing out how far behind Canada was in this matter. On their return to Canada Sir William Macdonald announced his intention of building and endowing the finest engineering school on the continent. This was Sir William Macdonald's first important donation to McGill; it was followed by so many others that he can justly be regarded as the second founder of the University. At Dr. Bovey's suggestion, Sir William built and equipped the splendid physical laboratory, and founded the chair in physics, the two first occupants of which have been Profs. Callendar and Rutherford. Dr. Bovey adhered with unflinching firmness, in spite of the grumbling of his more "practical" colleagues, to the necessity of a thorough mathematical training for engineering students; and as the excellence of McGill engineering graduates became known, they were so much sought after that Dr. Bovey used to have on his desk more offers of positions for his graduates than his entire graduating class could occupy.

As his success became evident, honours flowed in on him. He was given honorary degrees, was elected fellow of the Royal Society, honorary fellow of his college at Cambridge, and he was finally, in 1908, selected as first rector of the Imperial College of Science and Technology. At that time the faculty of applied science in McGill comprised more than 600 students, and was attracting men from all over America, and even from England. Alas! unknown to Dr. Bovey himself, the fatal disease which was to cut short his career had already fastened on him, and his short tenure of the rectorship of the Imperial College was a struggle against increasing ill-health until his resignation in 1909. Nevertheless he did the College invaluable service. Though a mathematician and engineer, his sympathies were not confined to those subjects; he took the broadest view of the possible services of the College to science, and gave cordial and effective support to the reorganisation and re-equipment of the biological departments of the College.

Dr. Bovey married in 1882 Miss Emily Redpath, a lady equally popular with himself, and a member of a leading Montreal family. He is survived by his widow, two sons, and three daughters. The elder son is pursuing a brilliant career at the Montreal Bar; the younger is a King's scholar at Westminster. No words could do justice to the attractiveness of Dr. Bovey's character. His sympathy, wise counsel, and practical helpfulness will long live in the memory of his friends, amongst whom were all the junior members of his staff in McGill, and especially those new to Canadian life. To those who, like the writer, were privileged to enjoy his intimate friendship, his death is an irreparable loss. E. W. M.

SIR WILLIAM ALLCHIN.

SIR WILLIAM ALLCHIN died in a nursing home in London on February 8, in his sixty-sixth year, some days after an operation and after several months of illness. The son of a doctor in Bayswater, he was, like his father, educated medically at University College Hospital. After being medical officer to the s.s. *Great Eastern*, which was employed in laying the submarine cable, he became assistant physician, and subsequently dean of the medical school at the Westminster hospital, with which he remained connected in the capacities of physician, consulting physician, and vice-president until his death. He was also consulting physician to the Victoria Hospital for Children, the Western Dispensary, and the St. Marylebone General Dispensary. He played a very active part in medicine in London, holding numerous offices and lectureships at the Royal College of Physicians, and at the Medical Society of London, of which he was president in 1901–2. He contributed articles mainly on abdominal diseases to standard works on medicine, such as Allbutt's "System of Medicine," Quain's Dictionary and the "Encyclopædia Medica," and edited, for Messrs. Macmillan, "A Manual of Medicine," in five volumes, the last of which appeared in 1903. His distinction as a physician was shown by his appointment as Physician Extraordinary to H.M. the King.

Sir William Allchin devoted much time and trouble to the University of London, and had an exhaustive knowledge of the tangled problems which have exercised medical educationists during the last twenty-five years. He was the representative of the Royal College of Physicians on the Senate of the University of London from 1902 to 1910, and probably his last appearance in public was as a witness before the Royal Commission on University Education in London in July, 1911, when he gave expression to his own views based on forty-five years' experience, during which he had been actively concerned in medical education and examinations.

At various times he examined at the Universities of London, Durham, and Glasgow, at the Conjoint Board of the Royal Colleges of Physicians and Surgeons, for the Naval, the Army, and the Indian Medical Services, and was also a member of the Advisory Medical Board of the Admiralty. He had a considerable knowledge of old medical books, and did much in arranging the library of the Medical Society of London, of which he was honorary librarian for eighteen years. He was also a high authority on precedence. He was not an original thinker or investigator, but his judicial mind, high standards, and conscientious devotion to the somewhat tedious work of committees have been of great value to the cause of medical education. H. D. R.

NOTES.

WE notice with the deepest regret the announcement of the death of Lord Lister, on February 10, in his eighty-fifth year. An account of his work appeared in our series of "Scientific Worthies" on May 7, 1896, and we hope to supplement this next week with a further appreciative statement of his services to science and humanity. The King has sent a message of sympathy to Lord Lister's family. Queen Alexandra and other members of the Royal Family have sent telegrams also, Queen Alexandra's message being in the following terms:—"Pray accept my most sincere sympathy in the great loss which the whole nation shares at the death of Lord Lister, whose name will ever be honoured and gratefully remembered as that of the greatest benefactor to suffering humanity throughout the world." Sir Ray Lankester has received the following telegram from the directors of the Institut Pasteur, Paris:—" L'Institut Pasteur vous prie d'exprimer à la famille de l'illustre Lister et à la Société Royale les regrets que lui cause la mort du rénovateur de la chirurgie.—Roux, Metchnikoff." We learn from *The Times* that the Dean of Westminster offered that the remains of Lord Lister should be interred in the Abbey, subject to the condition of cremation. The Royal Society and the Royal College of Surgeons also made representations to the Dean in the hope that this offer would be made. It appears, however, that Lord Lister expressed the desire that he should be buried in the Hampstead Churchyard, where his wife lies. The first part of the funeral service will be held in Westminster Abbey on Friday, beginning at 1.30 p.m. The Dean, accompanied by the Abbey clergy, will conduct the service. This evening the coffin will be taken from Lord Lister's London residence in Park Crescent into the Abbey, and placed in St. Faith's Chapel. There it will remain until to-morrow morning, when it will be removed to a spot facing the altar. Only members of the family will be present at the interment in Hampstead Churchyard.

We regret to see the announcement of the death, on February 12, at ninety-three years of age, of the Rev. Francis Bashforth, distinguished by his experiments in ballistics, and for some time professor of applied mathematics to the advanced class of Royal Artillery officers at Woolwich. *The Times* of February 14 gives the following account of his work:—Between the years 1864 and 1880 Mr. Bashforth carried out a series of experiments which really formed the foundation of our knowledge of the resistance of the air, as employed in the construction of ballistic tables. He published, notably, " A Report on the Experiments made with the Bashforth Chronograph, &c., 1865–1870," and another report dated 1878–1880, as well as " The Bashforth Chronograph " (Cambridge, 1890). These experiments were calculated to show that the resistance of the air can be represented by no simple algebraical law over a large range of velocity. Having abandoned, therefore, all *a priori* theoretical assumption, Mr. Bashforth set to work to measure experimentally the velocity of shot and the resistance of the air by means of equidistant electric screens furnished with vertical threads or wire, and by a chronograph which measured the instants of time at which the screens were cut by a shot flying nearly horizontally. Formulæ of the calculus of finite differences enabled the experimenter from the chronograph records to infer the velocity and retardation of the shot, and thence the resistance of the air. In consideration of the importance of these experiments and of his inventions, Mr. Bashforth received a Government grant of 2000*l*., and was also granted a pension.

We regret to learn of the death, on February 4, of Mr. George Edwards Comerford Casey. Born on March 19, 1846, Mr. Casey graduated at Lincoln College, Oxford, taking subsequently the degree of M.A. Although a teacher by profession, Mr. Casey spent the happiest days of his life on the sunny shores of the Mediterranean, and he will be best known to biologists as the anonymous author of " Riviera Nature Notes " (London: Bernard Quaritch), a stimulating and original book which, perhaps partly because not written on the conventional lines of a scientific treatise, imparts a living reality to the facts which it describes such as is very difficult of attainment in our modern text-books of " nature-study." The English translation of Prof. Strasburger's " Streifzüge an der Riviera " (London: T. Fisher Unwin) was prepared by Mr. Casey's two daughters.

On Saturday, February 24, Sir J. J. Thomson will begin a course of six lectures at the Royal Institution on " Molecular Physics." The Friday evening discourse on February 23 will be delivered by Mr. G. K. B. Elphinstone, on " The Gyrostatic Compass and Practical Applications on Gyrostats "; on March 1 by Dr. W. J. S. Lockyer, on " The Total Solar Eclipse in the South Pacific, April, 1911 "; and on March 8 by Dr. A. W. Ward, on " The Effects of the Thirty Years' War."

The council of the Society of Engineers (Incorporated) may award in 1912 two premiums of books or instruments, to the value of 8*l*. 8*s*. and 4*l*. 4*s*., as first and second prizes, respectively, for approved essays on the subject of " How to Improve the Status of Engineers and Engineering, with Special Reference to Consulting Engineers." The competition is open to all, but application for detailed particulars should be made to the secretary before entering. The last date for receiving essays is Friday, May 31.

At the anniversary meeting of the Royal Astronomical Society, held on February 9, the following officers and council were elected:—*President,* Dr. F. W. Dyson, F.R.S.; *vice-presidents,* Mr. E. B. Knobel, Dr. W. H. Maw, Mr. S. A. Saunder, and Prof. H. H. Turner, F.R.S.; *treasurer,* Major E. H. Hills, C.M.G., F.R.S.; *secretaries,* Mr. A. S. Eddington and Mr. A. R. Hinks; *foreign secretary,* Sir David Gill, K.C.B., F.R.S.; *council,* Sir R. S. Ball, F.R.S., Sir W. H. M. Christie, K.C.B., F.R.S., Rev. A. L. Cortie, S.J., Dr. P. H. Cowell, F.R.S., Dr. A. C. D. Crommelin, Rear-Admiral H. E. Purey Cust, C.B., R.N., Prof. Alfred Fowler, F.R.S., Dr. J. W. L. Glaisher, F.R.S., Mr. J. A. Hardcastle, Prof. H. F. Newall, F.R.S., Rev. T. E. R. Phillips, and Mr. F. J. M. Stratton.

As a result of the recommendations recently made by a joint committee of the South African Association for the Advancement of Science and the Royal Society of South Africa, a general committee, we learn from the December (1911) issue of *The South African Journal of Science*, has been constituted for the purpose of considering applications received for grants. Five grants, amounting in all to 250*l*., were made at the first meeting of the committee held towards the end of last year. The grants were:—(1) 40*l*. to Prof. W. A. D. Rudge, of Grey University College, Bloemfontein, to obtain a continuous record of the variations in the atmospheric gradient at various places, and to ascertain the relation between potential gradient and altitude, and between the diurnal variation of the gradient and the variation in the atmospheric pressure; (2) 45*l*. to Prof. A. Young, of the South African College, Cape Town, to investigate the occurrence of semi-diurnal, diurnal, and spring and neap tides observed in connection with an artesian well in the Cradock district; (3) 75*l*. to Miss D. F. Bleek, to proceed to the Kalahari, so as to obtain phonographic records of the spoken language of the Bushman tribes north of the Orange and Vaal Rivers; (4) 50*l*. to Mr. R. N. Hall, to visit localities in Rhodesia, where Bushman paintings exist; (5) 40*l*. to Mr. W. T. Saxton, of the South African College, Cape Town, for the purpose of studying the fungus diseases of trees in the Transkeian forests, investigating the ecology of the typical formations of the Transkeian territory, investigating a reported occurrence of the typical Western Province flora at St. John's, and to collect material for the study of the two genera of South African cycads, Stangeria and Encephalartos.

IN *Man* for February, Dr. C. G. Seligmann describes a cretinous skull found by Prof. Flinders Petrie while exploring a temple of Thotmes IV. at Thebes. He distinguishes this specimen from others of the achondroplastic type, because the arrest of the development of the nasal bones is very marked. In achondroplastic skulls, on the contrary, the nasal bones and the nasal processes of the maxillæ develop normally, though, owing to the shortness of the base, the angle made with the frontal may be abnormal. This specimen thus agrees in this particular with undoubtedly cretinous skulls, and may be regarded as that of an eighteenth-dynasty cretin.

MR. THOMAS E. SMURTHWAITE sends us a booklet entitled "Practical Anthropology," in which he has expanded his method of racial analysis. Mr. Smurthwaite's method is founded on a study of the contour of the head and face. In every nation or people he finds there are six types of head and face, and believes, therefore, that there were six original races. By a compounding of these original races the various nations and tribes have been evolved. We fear Mr. Smurthwaite's proposal to apply his methods to a racial analysis of school children is doomed to failure, because of the uncertainty in the recognition of the various types he seeks to differentiate.

WE note that Dr. Robert B. Bean employs a series of types in his description of the natives of the Philippine Islands. In a series of papers which have recently appeared in the *Philippine Journal of Science*, *American Naturalist*, and *American Anthropologists*, he classifies all men and women into three types—Primitive, Iberian, and Australoid. These three forms he regards as the fundamental units of mankind. He recognised them amongst the Negritoes and among the various tribes to be found in Luzon and Mindoro. Dr. Bean's colleagues, however, will find his excellent and numerous photographs more helpful than his text. It is very evident that the inhabitants of the Philippine Islands represent a most interesting congeries of peoples. Besides the small negroids—some of them might pass as natives of Equatorial Africa—it is plain that there are, in addition to the dominant Malay race, peoples who recall the Japanese, the Chinese, and the Ainus. Perhaps the most interesting discovery made by Dr. Bean is a native type of man with long bushy beard and European features. It seems possible that there are elements within the native tribes of the Philippine Islands which may throw light on the origin and distribution of the various races which are found on the shores of the Pacific Ocean.

THE last number of *The Bulletin of Entomological Research* (vol. ii., part iv., p. 357) contains an important memoir by Mr. R. W. Jack entitled "Observations on the Breeding Haunts of *Glossina morsitans*." A number of places in which the puparia of the fly were found are described, and illustrated by very good photographs. The puparia were always found at the bases of trees, in the soil, either sheltered by a hollow in the tree-trunk or under the exposed roots. On the other hand, negative results were obtained from careful search in the soil under bushes, although shaded, loose, full of humus, and covered with leaves; the writer is of opinion that the instinct of the parent fly is to avoid such places, where the pupæ would be in danger from the scratching of game-birds, &c. Along the Gorai River great numbers of guinea-fowl, "pheasant" (Pternistes), and francolin occurred, and there all the ground under the bushes had been scratched over and over again. The writer considers that "the tsetse-fly is such a comparatively slow breeder that it can scarcely afford to expose its pupæ to the scratchings of the game-birds." The practical bearing of these observations seems perfectly obvious: it is that fowls or other scratching birds should be encouraged or introduced in the forests or amongst the trees where the fly deposits its pupæ, especially in the vicinity of villages or homesteads, where the wild game-birds are naturally scared away.

Naturen for January, which appears in a new type of cover, contains a portrait and biography of Prof. W. C. Brøgger, the well-known geologist, and Rector of Christiania University. Its contents also include the first portion of the natural history results of the Danish oceanographic cruise of the *Thor* in the Mediterranean in the summer of 1910.

IN 1909 Mr. F. F. Outes, of the La Plata Museum, published the first part of what was intended to be a monograph of the morphology of the early inhabitants of Entre Rios, dealing in that instance with certain abnormalities in connection with the cranial sutures. The plan, as we learn from a second communication by the same author, published in vol. xviii. of the *Revista del Museo de la Plata*, has now been abandoned. Mr. Outes accordingly contents himself in the paper cited with describing certain cranial variations and abnormalities observable in the remains of these people preserved in the La Plata and Buenos Aires Museums.

No. 61 of *Publications de Circonstance*, issued at Copenhagen by the Conseil Permanent International pour l'Exploration de la Mer, is devoted to a report on the investigations on herrings in the North Sea conducted during 1910, the first part, by Messrs. J. Hjort and E. Lea, dealing with the whole question, and based on observations extending from 1907 to 1911, while the second, by Mr. Lea, discusses the growth of herrings. An important part of the investigation has consisted in the "grading" of herrings, that is to say, the determination of the range of variation presented by the individuals of the same age, or, in other words, of particular year-groups. There were from the first reasons to believe that the members of a shoal belonging to the same year and spawning together might represent different growth-types, and the features presented by those of 1904 proved this to be the case. In one lot of these herrings the growth-rings on the scales were of a normal, and in another of an abnormal, type. The abnormal type occurred in all the samples of what are known as "fat herrings" from Nordland in that year, and it served to show that by the autumn of 1909 the herrings in more southern waters were largely reinforced by a migration from the north. It has also been demonstrated that the "fat herrings" are fish of from one to seven, but chiefly of from two to four, years old, and that the youngest classes of the "large" and "spring herrings" are three-year-old fish, while the majority are from four to eight years old, although the shoals may include individuals up to sixteen or eighteen years. As regards the economic importance of such determinations, it is known that a great falling-off took place in the fisheries between 1904 and 1906, and that in 1907 there were no fish older than three years, and in 1908 none exceeding four years. This means that "fat herrings" were practically absent in 1902 and 1903. Obviously, then, determinations of this nature will afford means of predicting good or bad catches in the future when sufficient data are available.

MR. N. HOLLISTER, assistant curator of the Division of Mammals, U.S. National Museum, announces the discovery of four new animals from the Canadian Rockies in a paper just published by the Smithsonian Institution. During last summer a small party of naturalists from the Smithsonian

Institution accompanied the expedition of the Alpine Club of Canada to the Mount Robson region, where they made the first natural history collection ever taken in that vicinity. The natural history work of the expedition was under the charge of Mr. Hollister, who paid especial attention to the mammals, four of which he describes—a chipmunk, a mantelled ground-squirrel, and two bats. All the specimens come from the neighbourhood of Mount Robson, which lies in one of the wild and unexplored parts of British Columbia, at about 14,500 feet elevation. The chipmunk is a new species, and all the specimens of it come from the region along the boundary line between British Columbia and Alberta, from Yellowhead Pass northward. The ground-squirrel is a beautifully marked and highly coloured form of the genus, and was found living in the alpine meadows and rocks of the snow-covered region above timber-line. The head and shoulders are a rich and glossy Mars brown, and the sides are marked by conspicuous lateral stripes. While the two new species of bats resemble some well-known forms, externally they are distinct and readily distinguishable by the shape of the skull. One of them most resembles a species known only from Mexico. This paper forms No. 2062 of the Smithsonian Miscellaneous Collections.

THE Imperial Geological Survey of Austria has decided to reserve a whole volume of its *Abhandlungen* for a new and exhaustive description of the Miocene fossils of the Vienna basin. It is nearly half a century since Hoernes completed his well-known monograph on the fossil Mollusca of this region, and so much progress has been made during recent years in studying the fossils from corresponding deposits in other Mediterranean areas that a renewed examination of the Viennese collections has become necessary for comparative work. Dr. Franz X. Schaffer has begun the revision by a study of the bivalved shells from the Miocene of Eggenburg, and his results occupy the first part of the projected new volume, which has been recently issued. The concise descriptions are illustrated by forty-seven fine plates, towards the cost of which a large contribution has been made by the Krahuletz Society of Eggenburg. Dr. G. de Alessandri follows with a brief account of the cirripedes from the same formation, which, as might be expected, belong to genera and species of shallow-water habitat.

THE biennial report of the Connecticut Agricultural Experiment Station forms a ponderous volume of nearly 900 pages, containing reports of the analyst, entomologist, botanist, and forester. The station is required by statute to analyse yearly at least one sample of every commercial fertiliser offered for sale in the State, and to publish the results, together with the name of the dealer. A paper is contributed by Mr. East on the transmission of variations in the potato in asexual reproduction. All the observed asexual variations were losses of character, no new characters coming out. Otherwise there is a close parallel with the variations produced in sexual production.

THE report of the director of agriculture of the Federated Malay Straits shows that there has been a considerable change in the staff of the department, and in consequence no new work could be originated. There has been a great increase in the rubber output, which amounted in 1910 to 12,563,220 lb., as against 6,083,493 lb. for 1909; greater increases are anticipated during the next few years. Labour presents some difficulties, but on the whole the factors involved in the production of rubber are tolerably well understood. The working up of the raw rubber is still in the experimental stage. What is said to be wanted is a simple and trustworthy test for the strength of rubber as it leaves the plantation factory comparable with the polariscope test for sugar; at present rubber is judged only by colour and general appearance. Only two fungoid diseases were said to be serious, a root disease due to *Fomes semitostus*, and "die-back," due to *Thyridaria* (*diplodia*) *tarda*. *Termes gestroi* appears to be the most serious of the insect pests. Cocoa-nuts are also grown, and incidentally their husks furnish useful fuel for smoking rubber where this is carried out.

PROF. W. PFEFFER's paper on the mechanical prevention of sleep-movements in plants (*Abhandl. K. Sächs. Ges.*, 1911) is a continuation of his important work, "Investigations of the Appearance of Sleep-movements in Plants," published in the same journal in 1907—a paper in which nyctitropic movements were for the first time automatically recorded by a thoroughly good method. The most interesting result of the present paper is the discovery that the internal changes, on which sleep-movements depend, continue their normal course even when the leaves are fixed so that they cannot execute the normal movements. Thus a plant fixed in the diurnal position will assume the night position if released at the right hour, and in the same way a plant fixed in the night position wakes if freed in the morning. Similar conclusions are drawn from the study of leaves not kept absolutely still, but so as to show very minute sleep-movements.

IN the *Zeitschrift der Gesellschaft für Erdkunde* for 1911 there has appeared a series of descriptions of sheets of the 1 : 100,000 map of the German Empire, in which the principal geographical characteristics of each sheet are clearly summarised. Structure, surface, and erosive action are indicated wherever they are well shown, as well as the settlements, communications, and the general development of the region whenever these have been clearly influenced by the geography. More than one hundred and fifty sheets are also classified by the geographical forms which they represent, so as to be of use for geographical instruction.

WE have received a copy of the Almanac for 1912 which is compiled in the offices of the Survey Department for use in the Government offices of Egypt. Since five calendars are ordinarily in use, viz. the Mahommedan, Coptic, Jewish, Julian, and Gregorian, such a compilation is indispensable. The almanac also contains a large amount of information relating to the regulations, procedure, &c., of different Government departments, which is otherwise not always easy to obtain. It is of special interest to note that substantial brass plates have been laid down in a permanent manner at the headquarters of the administration in each province for the verification of the chains which are now generally used for land-measurement. Lengths of 20 metres and of 5 qasabas (17·75 metres) are defined by marks engraved on these plates.

IN the last number of the *Mitteilungen der k.k. Geographischen Gesellschaft*, Vienna, for 1911, Prof. A. Böhm von Böhmersheim discusses the definition of the critical angle of slope of an ocean basin as given by Prof. Krümmel in his recent manual of oceanography. The subject, as well as that of the critical depth, is discussed at length, new definitions are proposed, and formulæ are developed for computing these values, both on the sphere and on the spheroid. Besides the general case, special cases of the Black Sea, the Celebes deep, the Straits of Dover, and the Atlantic Ocean are examined, and the differences between the points of view of the two writers are indicated.

IN *The Geographical Journal* for February Mr. W. Harding King describes his journeys into the Libyan Desert to the south-west of Dakhla Oasis. He traversed a considerable sandstone plateau rising to an altitude of about 1800 ft., and forming part of the general plain of about 1200 ft. above sea-level, which probably extends to the oases of Kufra, which lie about 400 kilometres to the westward. The vast tract of sand dunes traversed by the Rohlf's expedition in 1874 was found to terminate a little to the north of latitude 25° N., and beyond this there only occurred small patches of drift sand and three of the narrow, but long and persistent, lines of dunes which are so characteristic of the Libyan Desert. The same number gives a summary of the results obtained by the expedition sent to South America by Mr. Bullock Workman to determine the altitude of Mount Huascaran, in Peru, which had been stated to be more than 24,000 ft. M. E. de Larminat measured a base of 1606·6 metres at a height of 3790 metres on the flanks of the chain, levelled up from the Pacific Coast to one of the triangulation stations, and finally obtained triangulated values for the different peaks of Huascaran ranging from 6763 to 6418 metres above sea-level.

THE Hon. Miles Staniforth Smith, Administrator of the Territory of Papua, gave an account of his recent expedition into the western part of the territory before the Royal Geographical Society on Monday, February 12. The expedition entered the hilly country from the end of the navigable portion of the Kikor River, and made its way with great difficulty across the southern portion of a deeply dissected limestone plateau, which rose generally to a height of about 5000 ft. The country was covered with dense jungle, and in the course of the march Mount Murray, the highest peak met with, 8000 ft., was ascended without any view of the summit having been obtained when its foothills were first encountered. The dominant trend of the valleys was north-west to south-east, and along them the expedition marched until it reached a point believed to be near the Strickland River. Being very short of food and water, the mountain slopes had to be left for the valley floor, which proved to be occupied by a rushing torrent flowing between precipitous rock walls. Compelled to build rafts, the expedition was wrecked in the rapids, losing the whole of its instruments, baggage, food supplies, records, and collections, only reaching a base camp of a relief expedition after the greatest hardships. The country is described as the forward edge of an elevated and strongly dissected plateau of coral limestone, in which intrusive basalt occasionally occurs, and the boulders found in the stream bed seem to point to a greater development of this rock to the northward. Part of the plateau is of the "karst" type, water being scarce, streams sinking into swallow-holes, and subterranean river courses being extensively developed. Coal of a hard quality was found at several points, and is ascribed to Carboniferous or Permo-Carboniferous age, but the evidence for this was not stated. The expedition succeeded in maintaining the best relations with the natives, who aided with food and with information, often on very critical occasions.

THE fourth part of the current volume of the *Mitteilungen aus den Deutschen Schutzgebieten* is mainly taken up with the meteorological observations from Togo and from German East Africa for the year 1909. Improved determinations of humidity are obtained by the use of Assmann s aspiration psychrometer at all stations in Togo for the humidity observations, and at several stations in German East Africa. The mean maxima observed at Dar-es-Salam with a radiation thermometer are given for each month for 1899 to 1908. Another article gives a summary of geological investigation in the Cameroons, the principal localities in which mineral deposits have been located being shown on a small map of the colony.

THE synoptic weather charts of the North Atlantic and adjacent coasts for January 11–17, prepared from reports by radio-telegraphy and otherwise, and published in the Meteorological Committee's chart for the current month (first issue), exhibit a very interesting situation. Large anticyclones lay over northern Europe and North America; on January 14 the barometer in Finland rose to 31·2 in. Over the Atlantic the weather remained in a very disturbed state, with frequent south-westerly gales east of longitude 30° W., and strong north-westerly winds on the further side of the ocean; a very deep secondary disturbance gradually embraced practically the whole of the North Atlantic. On the evening of January 14, in latitude 52° N., longitude 30° W., barometer readings were below 28·2 in., just 3 in. lower than over northern Europe. From the latest reports received the Meteorological Office was able to give valuable information as to the probable weather between Ireland and mid-ocean during the next few days.

THE Australian Central Weather Bureau has issued an average rainfall map of South Australia and the Northern Territory, on the same plan as those already published for other States; only stations with at least fifteen years' records have been used. The chart shows clearly the rapid decrease of the rainfall from the agricultural areas northwards to the interior, where, in the Lake Eyre basin, the average annual fall is under 5 in.; the area in square miles in which the fall is under 10 in. is given as 317,600 in South Australia and 138,190 in the Northern Territory. In the latter district the mean annual rainfall is given as 24·65 in., ranging from 62·12 (at Port Darwin) to 5·54 in.; in the Pastoral Interior 7·26 in., ranging from 12·99 to 3·79 in.; in the agricultural settled districts 18·93 in., varying from 46·99 (at Stirling West) to 7·12 in. The line (14–16 in.) representing the limit of safe agriculture is plotted on the map.

THE recent publications of the U.S. Coast and Geodetic Survey include volumes of magnetic observations at the observatories of Porto Rico and Baldwin (Kansas). The Porto Rico volume covers the two years 1907 and 1908. In April, 1907, the magnetographs were moved from a room in Fort Isabel Segunda, on Vieques Island, which they had occupied since their erection in 1903, to a site about a kilometre distant, on Vieques Sound. They were re-erected in a new building, the construction of which is described. It is wholly above ground, but suffices to secure a satisfactorily uniform temperature, the climate having small temperature variations, whether daily or annual. As in previous volumes, particulars are given of the hourly readings of the curves, and diurnal inequalities are derived from ten quiet days a month. Copies are given of some of the most disturbed curves. During 1908 the horizontal force magnetograph had a large drift of zero, and numerous discontinuities also appeared in the curves, so that the records do not seem altogether trustworthy. The second volume gives data for Baldwin from January, 1907, to October, 1909, when the observatory was discontinued and the instruments transferred to a new observatory at Tucson, Arizona. The contents are similar to those of the Porto Rico volume. The copies of highly disturbed traces include that of September 25, 1909, the only magnetic storm during the period included which reached the highest grade of disturbance. Temperature changes in Baldwin Observatory were so large as to be decidedly prejudicial to the working of the magnetographs. The vertical force instrument naturally suffered most, but even the declination instrument gave trouble at times.

The leakage of steam past piston valves has formed the subject of a research conducted at Birmingham University by Mr. H. Denzil Lobley, and the results are given in an article in *The Engineer* for February 9. A special jacketed cylinder was used, and could be supplied with either saturated steam or with steam superheated up to 900° F. The valve could be driven at different speeds by means of an electromotor. The principal conclusions are as follows:—(*a*) Piston-valve leakage is not responsible for any appreciable amount of the "missing quantity," or the leakage of a well-fitted piston valve is practically negligible. (*b*) The leakage does not follow the law $K=CP/L$. (*c*) The leakage diminishes proportionally to the increase of temperature until 500° F. is reached, after which the distortion of the rings causes it to increase. From these results it appears that the piston valve has advantages over the flat slide valve other than those due to the fact that the piston form is balanced. It is probable, and indeed is almost proved by Callendar and Nicholson's experiments, that the great difference in leakage of the two types is owing to the fact that slide valves warp, and thus lift off the face. Warping is eliminated in piston valves, except at high temperatures, and hence the leakage is very small.

Mr. Frank Fielden deals with a few problems in bituminous suction-gas plants in *Engineering* for February 9. An examination of the specifications issued by suction-gas plant makers shows that in most cases a good average quality of dry anthracite coal of a certain size is expected to be used to fulfil the guarantees as to fuel consumption and quality of gas to be produced. There are, however, strong incentives to the engineer to construct a suitable suction-gas generator for the satisfactory gasification of native coals, which have hitherto been unemployable for the purpose. Mr. Fielder summarises the ideal suction plant as follows:—It will consume all the volatile matter contained in the coal in addition to the solid carbon; to effect this, some mechanical feeding of the fuel at a regular rate to suit the load on the engine would seem desirable. Caking coal will be so treated as to prevent arching over, and consequent obstruction to an equable air and vapour supply in the main fuel column of the generator. Suitable facilities will be provided for the effectual removal of ash and clinker without interfering with the quality of gas produced; this is essential for all coal used on extended periods of running. It is, of course, assumed that the ordinary factors will also be considered, such as amount of space occupied, simplicity of construction, minimum amount of attention, and reasonable first cost.

OUR ASTRONOMICAL COLUMN.

The Changes on Saturn's Rings.—From the current number of *The Observatory* we learn that Prof. Todd claims an alternative translation for his telegram (which was in Latin) concerning the changes on, and probable "dissipation" of, Saturn's rings. It is suggested that the term "dissipation" did not refer to the actual rings.

Ephemeris for Borrelly's Comet, 1911*e*.—In No. 4552 of the *Astronomische Nachrichten* M. Fayet gives a bi-daily ephemeris for comet 1911*e* extending to May 13. The comet is at present in Perseus (R.A. = 3h. 54·8m., $\delta=+45° 57'$), and is travelling towards Auriga in a direction slightly north of east; it is, however, very faint, and is receding from both the earth and the sun.

Stellar Spectra in the Visual Region.—Although the photographic spectra of many stars have been more or less exhaustively studied in the region more refrangible than $H\beta$, the study of the less refrangible region has been restricted, except for a few of the brighter stars, by the lack of sensitiveness of photographic plates in that region. An attempt to remedy the omission appears in No. 4552 of the *Astronomische Nachrichten*, where Dr. Hnatek publishes reductions of the spectra of γ Andromedæ, α Cassiopeiæ, α and γ Cygni, and α Persei in regions less refrangible than λ 4861. The spectra were taken in 1907, for another purpose, by Herren Eberhard and Ludendorff with Spectrograph V. of the Potsdam Observatory; pinacyanol-bathed plates, by Wratten and Wainwright, were employed, but the spectra are still under-exposed.

The reductions are not very exhaustive; for example, Dr. Hnatek gets nine lines in the spectrum of α Cygni between λ 4861 and λ 5316·85, whereas the South Kensington published reduction gives twenty-eight. Further, he gives, generally, Rowland's origins and intensities, which in an "enhanced-line" star do not represent the facts; only occasionally does he refer to the enhanced lines published by Lockyer, and thus at times misinterprets the significance of an origin, or an exceptional intensity, of a line. For each star he has deduced from his measures the radial velocities at certain epochs, which he tabulates at the end of the paper.

Stellar Parallaxes.—A second series of stellar parallaxes, determined from meridian transits at the Washburn Observatory, Wisconsin, is published by Mr. A. S. Flint in No. 631 of *The Astronomical Journal*. The observing list consisted primarily of stars between magnitudes 1·5 and 2·5, but some fainter stars were added, and in the final list are given the parallaxes of 124 stars. Among the brighter stars the following large positive parallaxes are given:—β Persei, +0·130″; α Persei, +0·109″; β Canis Maj., +0·163″; α Geminorum (pair), +0·174″; γ Leonis, +0·105″; β Ursæ Maj., +0·136″; α Serpentis, +0·151″; and α Ophiuchi, +0·127″; while the 3·7-magnitude star ϵ Eridani has a parallax of +0·379″ in Mr. Flint's list. A general average of the probable errors of the final parallaxes is ±0·031″, and after discussing the data in a number of different ways Mr. Flint concludes that the parallaxes given are sensibly free from systematic error.

The Spectra of Comets.—The February number of *L'Astronomie* contains an interesting paper in which Comte A. de la Baume Pluvinel discusses the spectra of comets, more especially as revealed by the researches of the past few years.

After briefly summarising the earlier observations, he describes at length the spectrum of the Morehouse comet, and reproduces an excellent comparison showing the close identity of the doublets in that spectrum with doublets occurring in Prof. Fowler's spectrum of carbon monoxide at low pressure.

In conclusion, he points out that to answer the question, "What are comets made of?" would have been comparatively simple, say, a dozen years ago, but to-day the photographic method has revealed so much that was then unknown that the answer is not so easy. The composition of comets is complex, and all comets do not display the same composition. As our knowledge extends still further it may become necessary to classify comets in spectral classes; in fact, this has already been done in a simple fashion. Some comets are essentially gaseous and blue, *e.g.* Morehouse; others, like the great comet 1910*a*, are yellow, and contain much solid matter.

The Parallax and Proper Motion of Mira.—In No. 44 of the *Mitteilungen der Nikolai-Hauptsternwarte zu Pulkowa* Herr S. Kostinsky discusses at length the parallax observations of Mira made by him during the period 1903–7. The main discussion is printed in Russian, but there is a *résumé* in German, in which the principal stages and results are described.

Among other results, the author finds that the yearly parallax of Mira is probably zero, and in any case does not exceed +0·05″. The yearly proper motion in R.A. is extremely small, and in declination is about −0·235″.